

### **REMARKS**

Claims 1 to 21, 23 and 24 stand pending in the application. Claim 23 is amended to clarify that the Claim is dependent upon Claim 16, which was previously amended to incorporate the subject matter of cancelled Claim 22. The amendment does not raise any issues that require further search and consideration. No new matter is being added.

The Examiner is respectfully requested to reconsider the claims and withdraw the finality of the rejections in view of the remarks contained herein.

### **PREMATURENESS OF THE FINAL REJECTION**

The Examiner has stated that the present action is made final because Applicant's amendment necessitated the new ground(s) of rejection. *Final Rejection* of August 17, 2006, page 6. However, Applicants respectfully suggest that the finality of the present action is premature.

Under MPEP 706.07(a), a final rejection is improper where there is a new ground of rejection introduced which was not necessitated by an amendment to the claims. The new grounds for rejection under § 112, relating to the alleged indefiniteness of the term "a capillary delivery pressure," were not necessitated by Applicants amendments. It is respectfully pointed out that this term was not the subject of a previous amendment. Even more, the term was not referred to in any of Applicants' previous arguments. Thus, the rejection under § 112 was not necessitated by a previous amendment and the finality of the present action is not proper.

Accordingly, Applicants respectfully request that the finality of the present rejections be withdrawn.

### **CLAIM OBJECTIONS**

Claims 23 and 24 stand objected to for being dependent on a cancelled claim. Applicants thank the Examiner for pointing out this incorrect dependency, and have amended Claim 23 to recite dependency from Claim 16. Thus, the Claims 23 and 24 are now properly dependent in form.

### **REJECTIONS UNDER 35 U.S.C. § 112**

Claim 14 stands rejected as indefinite under 35 U.S.C. § 112, second paragraph. This rejection is respectfully traversed.

As stated in *Phillips v. AWH Corp.*, “in light of the statutory directive that the inventor provide a ‘full’ and ‘exact’ description of the claimed invention, the specification necessarily informs the proper construction of the claims.” 415 F.3d 1303, 1316 (Fed. Cir. 2005).

The phrase “a capillary delivery pressure,” as defined by the specification, is not an indefinite term. For example, at paragraph [0030], capillary delivery pressure is defined as “a pressure which will deliver a beneficially humidifying flow of water via capillary elements embedded within gas diffusion assemblies of fuel cell stack system . . . .” Additionally, at paragraph [0054], the specification informs that “[w]ater in water flow channels . . . is provided by a water source pressurized to an appropriate pressure for capillary delivery through [the] vias . . . so that an appropriate . . . amount of water is drawn into [the] hydrophilic layer . . . .”

It is clear that that the amount of pressure that is a “capillary delivery pressure” is a one sufficient to deliver a beneficially humidifying flow of water to the hydrophilic layer.

Accordingly, the rejection for indefiniteness under § 112, second paragraph should be withdrawn.

**REJECTION UNDER 35 U.S.C. § 103 OVER NELSON ET AL. IN VIEW OF OUVRY ET AL. AND LLOYD ET AL.**

Claims 1 to 3, 10 to 21, 23 and 24 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nelson et al. (U.S. Patent No. 6,150,049) in view of Ouvry et al. (U.S. Patent Number 6,444,347) in further view of Lloyd et al. (U.S. Pre-Grant Publication No. 2004/0086775). The rejection is respectfully traversed.

The prior art references when combined do not teach or suggest a gas diffusion medium having at least one capillary element extending from a hydrophobic layer to a hydrophilic layer. Also, the combined references do not teach or suggest a gas diffusion medium having a hydrophilic layer adjacent a membrane electrode assembly (MEA). Thus, for each of these reasons, Applicants respectfully submit that a *prima facie* case of obviousness has not been established.

**A.) At Least One Capillary Element Extending Through the Hydrophobic Layer and Terminating in the Hydrophilic Layer**

The Examiner has asserted that Lloyd anticipates the capillary elements of the present claims. *Final Rejection* of August 17, 2006, page 4. Applicants respectfully disagree. Instead, Lloyd describes a porous metalized diffusion layer, e.g. a carbon fiber-based sheet with a porous metal coating. Lloyd at paragraphs [0044] - [0045].

The recited capillary elements are different from the pores of a gas diffusion medium. This is evidenced by, for example, Figures 3-5 reproduced below:

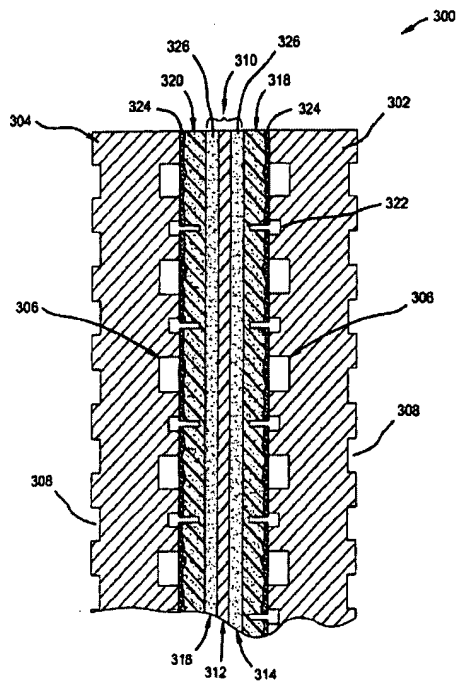


FIG 3

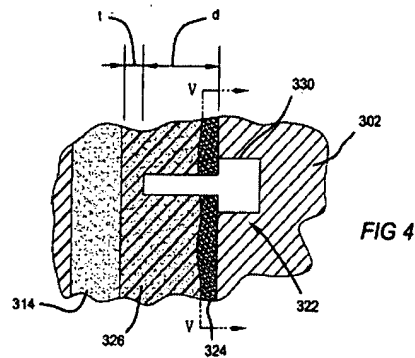


FIG 4

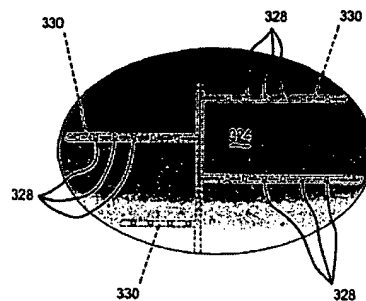


FIG 5

These figures show that the capillary element extends from a water flow channel inside a separator plate, through a hydrophobic layer, and terminates in a hydrophilic layer. Additionally, the specification states that the capillaries are formed as a blind bore or via extending into the gas diffusion media. Specification at paragraph [0054]. The capillaries are not pores present as part of the porous diffusion media. Thus, it should be recognized that the Lloyd reference does not describe the claimed capillary elements (formed channels or vias).

Applicants further point out that the claims require the capillary element to terminate in the hydrophilic layer. This is necessary so that liquid water flow is not directly provided to the face of catalyst in the membrane electrode assembly. Specification at paragraph [0054]. In contrast, Lloyd merely describes a porous gas

diffusion layer having a volume of interstices relative to the volume of the material. Lloyd at paragraph [0033]. Such a layer is provided, for example by Toray carbon paper. Lloyd at paragraph [0038]. Lloyd does not describe any particular spatial placement of pores (e.g. starting in one layer and terminating in another). For this additional reason, Lloyd does not describe the capillary elements of the present claims.

It is also respectfully noted that diffusion media are generally porous and gas permeable. Specification at paragraph [0034]. Thus, the capillary elements of the claims are embedded in gas diffusion media *already having* pores. One of ordinary skill in the art further appreciates that a capillary element is different from a pore in a porous substrate. For at least this further reason, the Lloyd reference does not describe the capillary element of the present claims.

#### **B.) A Hydrophilic Layer Formed Adjacent the MEA**

The Examiner has correctly asserted that Nelson fails to teach a gas diffusion medium having a hydrophilic layer adjacent the MEA. *Final Rejection* of August 17, 2006, page 3. Applicants also respectfully submit that the cited Ouvry reference does not provide such a teaching. Ouvry merely describes an *electrode* having hydrophilic carbon cloth surrounded by a hydrophobic polymer matrix (e.g. PTFE or PTFE/Nafion). See col. 5, lines 1-27; col. 9, lines 1-7; Figure 1; and Claims 1-3 and 6-10. Since the hydrophilic layer of Ouvry is surrounded by the hydrophobic matrix of the electrode, the Ouvry hydrophilic layer cannot be adjacent the MEA.

In contrast, Claims 1 to 3 and 10 to 15 recite a gas diffusion medium with a hydrophilic layer adjacent an MEA. An MEA includes a proton exchange membrane (PEM) having an anode catalyst and a cathode catalyst formed on opposite sides

thereof and defining active areas on the MEA. Specification at paragraph [0036]. As recited in the present claims, the membrane electrode assembly has an active area formed on a PEM. A PEM is different from an electrode coating, which is what the carbon paper of Ouvry is adjacent.

This point is particularly illustrated by the claims of the Ouvry reference. For example, Ouvry Claim 10 recites an electrode having catalysts in contact with a solid electrolyte. Then, Ouvry Claim 11 recites an electrochemical fuel cell having a PEM *and* the electrode of Ouvry Claim 10. Thus, Ouvry differentiates the hydrophobically coated electrode from the PEM. These claims thus demonstrate that the hydrophilic carbon paper of Ouvry is not adjacent to an MEA, and therefore does not disclose all of the limitations of Claims 1 to 3 and 10 to 15.

For at least this further reason, the combined Nelson, Ouvry, and Lloyd references do not render Claims 1 to 3 and 10 to 15 obvious or unpatentable.

**REJECTION UNDER 35 U.S.C. § 103 OVER NELSON ET AL. IN VIEW OF OUVRY ET AL., LLOYD ET AL., AND IMAHASHI ET AL.**

Claims 4 to 9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nelson et al. (U.S. Patent No. 6,150,049) in view of Ouvry et al. (U.S. Patent Number 6,444,347), Lloyd et al. (U.S. Pre-Grant Publication No. 2004/0086775), and in further view of Imahashi et al. (U.S. Pat. No. 5,350,643). This rejection is respectfully traversed.

As established in the above arguments, the combined Nelson, Ouvry, and Lloyd references do not teach or suggest all the limitations of present Claim 1, upon which Claims 4 to 9 depend. The Imahashi reference, cited by the Examiner as a reference

teaching hydrophobicity gradients, does not provide the teachings of limitations missing from the other cited references. Thus, Claims 4 to 9 are patentable over the combined Nelson, Ouvry, Lloyd, and Imahashi references.

#### CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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